GPS SITE SURVEYING STANDARD OPERATING PROCEDURE MANUAL

Attachment G

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GPS SURVEYING DRAFT

Procedure for Survey of TRS/ART Location, Radiosonde Release Location, SPS GPS Antenna Location, and PDB location.

It is recommended that the system not be placed in any hazardous type of weather (i.e. heavy rain, snow, etc). Although the system is to a degree "waterproof", it is not recommended for fear of water finding a way into the GPS receiver. Also recommend the unit not be used in conditions where temperatures are within -40°C<X<65°C.

SETTING UP THE GPS RECEIVER

The GPS Receiver, in its default setting, will automatically receive data in a "Static" form. This is the type of data needed for this process. There should be no need to have to set up the receiver in any way for our GPS surveying process. If for some reason you need or want to set up the receiver in a manner that is not of the default variety (i.e. kinematic data transmission, timed surveying, etc), the enclosed GPS 5700 manual will direct and walk you through the process.

SETTING UP THE TRIPOD, GPS RECEIVER, ZEPHYR, AND ASSOCIATED CABLES

This section has two sets of directions: One set will be for setting up the unit in a radome without a TRS or for any random survey point, and another set will be for a unit that has a TRS. If you are taking a GPS survey point for the RSOIS, set up under the temperature sensor.

WITHOUT A TRS OR FOR A GENERAL SURVEY POINT:

1) Clear the radome of all old radiosonde equipment. Mark the TRS mounting points on the floor of the radome. Mark the center point between the TRS mounting points.
2) Set up the GPS antenna tripod over the center point of the TRS footprint. The center pole point should be placed directly on the center point of the TRS footprint. Extend the three legs so that the tripod is approximately level. Using the spring-loaded adjustment levers on two of the legs, level the tripod accordingly. The bubble level mounted on the tripod will give you a fairly approximate level reading.

Figure 1. GPS Antenna Tripod

3) Once the tripod is level, verify the point on the end of the center pole is still setting on the center mark of the TRS footprint. (Even the slightest nudges can knock the tripod out of level, make sure to check it after every step)
4) Mount the GPS antenna on the tripod and orient the north arrow on the GPS antenna (Zephyr) to agree with the compass on the tripod. The north arrow can be found on the underneath side of the Zephyr labeled with a diagram and at position number 1.
5) Measure the height from the indented line that rims the Zephyr down to the radome floor. This measurement should be made in meters, and be measured to an accuracy of 0.001 m. Note this measurement.
6) Hang up the yellow Trimble GPS receiver onto the red knob and associated velcro strip. Make sure to once again check the level bubble. (**Proceed to Powering on and Collecting Data)**

Figure 2. Trimble GPS Receiver on GPS Antenna Tripod

WITH A TRS:

1) Make sure the TRS/UPS is turned off.
2) Gently pull down on the dish of the TRS so that you can reach the NAGS. Make sure the NAGS is facing as close to due North 0° as possible.
3) Unscrew 4 NAGS screws to allow the NAGS flush-mount plate to be placed on the end of the NAGS. Screw on with 4 given screws.

Figure 3. NAGS flush-mount plate on NAGS end

4) You can now place and screw on the Zephyr Antenna on to the threaded end of the bolt. Make sure the number 1 arrow on the bottom of the antenna (also note the Trimble sticker designating the area) is facing straight down. When the dish is in the upright position, this will have the antenna facing due north.
5) Using the yellow GPS cable, connect one end (straight end) to the GPS port on top of the yellow Trimble GPS receive. The other GPS connection (right angle) should screw on to the bottom of the Zephyr.
6) ** This step is only if you are not using the internal batteries given**. Connect the external power cable to the external power port (either port 2 or port 3) by matching up the red dots on the port and the cable end. Do not force them together as this may cause the pins to bend.
7) ** This step is only if you are not using the internal batteries given**. Connect the external power cable to a power cord, and plug the power cord into an associated outlet.
8) You are now ready to power on and collect data.

POWERING ON AND COLLECTING DATA

1) Make sure you have the correct settings (if needed) for the GPS Receiver. The default settings are the correct settings unless otherwise noted.

2) To turn on, press the green power button on the front of the receiver. A green light should light up on either 2 or 3, depending which port you have the power cord plugged in to, or whichever battery is currently running.
3) Once your green light is on, look to the left part of the panel to see if there is a blinking light under the GPS mark (red light). Once this light goes from fast blink to slow blink, you can now press the blue button (data button). An orange light will appear signifying data is now collecting.
4) Allow the receiver to stream data for approximately 4 hours.
5) When the allotted time is up, hold the power button down for two seconds, you should see all of the lights turn off. This will turn the power off. You can now disconnect, and disassemble the GPS unit.

TRANSFERING DATA FROM RECEIVER TO COMPUTER

1) Plug the power cord into an outlet, the cable connection to Port 2 of the receiver, and the comp port into the back of the computer. Now hook up the USB cord from the bottom of the GPS receiver (there is a latch at the bottom of the receiver that opens up) to the computer. The receiver is now hooked up to the computer.
2) Select All Programs, Trimble Data Transfer, Data Transfer (A data transfer window will appear)
3) Make sure the drop down box on the top left under 'Device' says "GPS Recvr-5000 Series: COM 1". You should see on the top right a green check mark stating the device is connected to the computer.

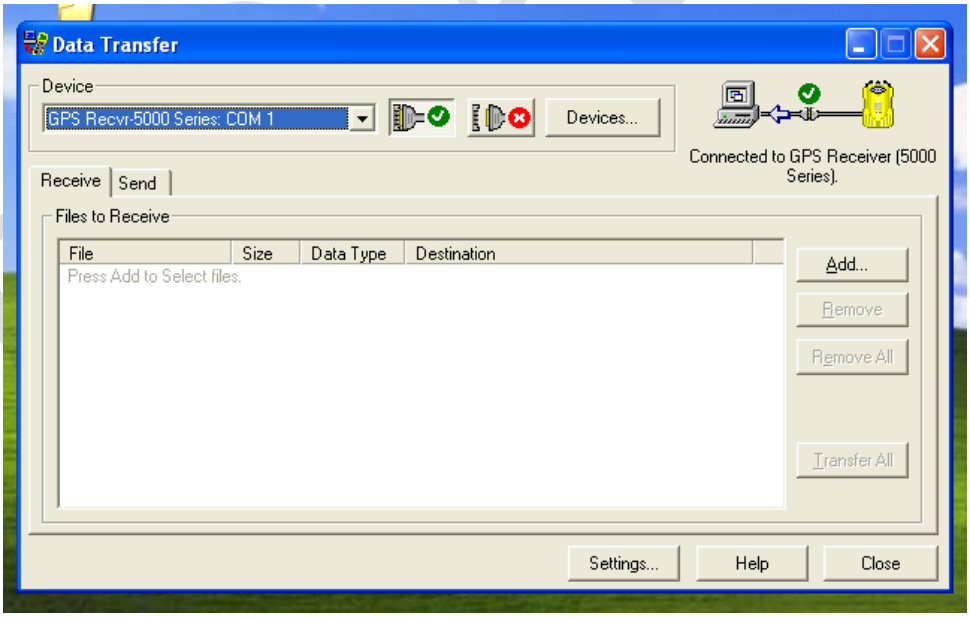

Figure 4. Data Transfer Window

4) Click on the 'Add' button which will bring up an Open Window. In that open window select the Yellow Icon that says 5700-xxxxxxxx
5) You should now be able to select the latest GPS data file. Open this file.

6) After clicking 'open' you should now be back to the Data Transfer Window along with the file attached. You can now click 'Transfer All'. Once the file has transferred you will have a Transferred Completed box appear. Click close.
7) Two files have now been created: a .dat and a .T00 file. They are both placed in the GPS DATA file on the desk top.

SENDING DATA TO OPUS

1) Open up IE and go to the website: http://www.ngs.noaa.gov/OPUS/index.jsp
2) Click on the box on the right that says: NAD 83 (CORS96, MARP00, PACP00) epoch 2002.00 ITRF00
3) Enter your email address.
4) For the data file, enter the .dat file (this file will show up in the GPS folder as the one that's not .T00)
5) The antenna type is: TRM41249.00 SCIT Zephyr 4-Point feed antenna –Stealth Group
6) Enter the distance (in meters) that you measured outside from the base of your point to the line in the Zephyr. ***If you are inside a radome make sure you run opus 2 times. First time you will enter 0 for your height. This will give you an approximate 1 meter difference from the GPS egg to the end of your antenna. Add .9 meters to the meta-data table. The second time you enter the data in OPUS, enter 1.22 as your (m) height. This is a correction factor for launch height. The delta between your two OPUS solutions should be roughly 2m.
7) Click Options and make sure the Geoid Model is Geoid 09
8) Click on "Upload to Static"
9) An email should be sent to you within 15 minutes with an attachment giving you your ortho height and lat/lon's

FINDING HEIGHT/DISTANCE USING LINE OF SIGHT FOR SURFACE EQUIPMENT

This section will allow you to determine an objects height once you determine a base height, for instance the surface release point. Once that height has been determined, you will be able to use this procedure to accurately determine the height of surface instruments (i.e. RSOIS) or any other object for that matter. You will also be able to determine distance away from a reference point, along with the angle at which it is located. For these surveys, we will use the release point as our reference point. This procedure usually takes two people.

1) For this type of survey we will use the release point as our reference point. However, you can certainly use this method to create your own reference point, site dependent. Configure the tripod as you normally would for a GPS survey. However, this time you will only need to screw on the Optical Survey unit. Make sure the unit is level, on the tripod and the Optical unit.

2) Once the entire unit is level, rotate the Optical unit 180º, making sure the entire unit is still level. If it is not, follow the instructions in the handbook which should be located in the Optical unit's box. These directions will show you how you are to readjust the unit to calibrate it.
3) Measure the height from the ground to the middle of the optical lens and write down that value in inches.
4) Have the other person hold the meter extendable ruler on the ground (vertically) of the location you want to survey and use the optical unit to zoom in on the numbers.
5) Once you focus on the numbers, look for the number that falls into the center cross-hairs. If that number is lower than the value of your height that you wrote down earlier, than the position you are measuring (area where ruler is at) is higher than your location, and vice versa.
6) Use the top cross hair and the bottom cross hair to determine the distance in feet you are away from the ruler. Take the top cross hair and minus the bottom cross hair. Take that value and times it by 100. (If top was 30" and bottom was 28": 30"-28"= 2 x 100= 20 feet.
7) If you're attempting to use a reference point from inside, a laser level is available to shoot a laser outside to a point, usually on the ruler. That point can be used to do your measurements.